CLAIMS:

1. A method comprising:

processing a stream of information-bearing symbols to form a plurality of symbol blocks, wherein each symbol block comprises one or more of the information bearing symbols;

generating multiple ultra-wideband (UWB) waveforms from the symbol blocks, wherein each of the UWB waveforms convey the symbols of their respective symbol blocks as pulses repeated over a plurality of frames; and

transmitting the UWB waveforms over different antennas as a space-time coded UWB communication.

2. The method of claim 1,

wherein processing a stream of information-bearing symbols comprises duplicating each symbol to form a first symbol block and a second symbol block each comprising the same information bearing symbol,

wherein generating multiple UWB waveforms comprises generating a first UWB waveform from the first symbol block and a second UWB waveform from the second symbol block, and

wherein transmitting the UWB waveforms comprises simultaneously transmitting the first UWB waveform from a first transmit antenna and the second UWB waveform from a second transmit antenna.

3. The method of claim 1,

wherein processing a stream of information-bearing symbols comprises parsing the stream of symbols into blocks of symbol pairs,

wherein generating multiple UWB waveforms comprises generating a first UWB waveform to transmit the symbol pairs in a first order and a second UWB waveform to transmit the symbol pairs in a second order opposite from the first order, and

wherein transmitting the UWB waveforms comprises simultaneously transmitting the first UWB waveform from a first transmit antenna and the second UWB waveform from a second transmit antenna.

4. The method of claim 1, wherein processing a stream of information-bearing symbols comprises:

parsing the stream into a first block of symbols while maintaining an order of the stream of symbols; and

permuting the symbols of the first block to form a second block in which the symbols are in an order different from the order of the stream of symbols.

5. The method of claim 1, wherein generating multiple UWB waveforms power loading and pulse shaping each of the symbols of the symbol blocks to generate the pulses for transmission repeatedly over the plurality of frames.

6. The method of claim 1, wherein generating multiple UWB waveforms comprises applying pulse amplitude modulation.

7. The method of claim 1, wherein generating multiple UWB waveforms comprises applying pulse position modulation.

8. The method of claim 1, wherein generating multiple UWB waveforms comprises:

permuting the frames to interleave the frames; and

generating multiple UWB waveforms from the interleaved frames.

9. The method of claim 1, further comprising:

receiving the transmitted UWB waveforms through a wireless communication channel with a plurality of receive antennas; and

performing maximum ratio combining (MRC) on the plurality of frames to produce a stream of estimate symbols.

10. The method of claim 9, wherein receiving the transmitted UWB waveforms comprises:

receiving a first UWB waveform of the transmit signals with a receive antenna;

receiving a second UWB waveform of the transmit signals with the receive antenna, and

wherein performing MRC comprises:

performing maximum ratio combining (MRC) on the first UWB waveform to yield a first decision statistic;

performing MRC on the second UWB waveform to yield a second decision statistic;

combining the first and second decision statistics to create a combined decision statistic; and

outputting an estimate symbol based on the combined decision statistic.

11. The method of claim 9, further comprising separating the received UWB waveforms into even and odd indexed frames at the receive antennas.

12. A wireless communication device comprising:

a space-time (ST) encoder that processes a stream of information-bearing symbols to form a plurality of ST-encoded symbol blocks, wherein each symbol block comprises one or more of the information bearing symbols;

a plurality of pulse shapers that generate multiple ultra-wideband (UWB) waveforms from the symbol blocks, wherein each of the UWB waveforms convey the symbols of their respective symbol blocks as pulses repeated over a plurality of frames; and

a plurality of antennas that transmit the UWB waveforms over a wireless communication channel.

13. The wireless communication device of claim 12, wherein the ST encoder duplicates each symbol to form a first symbol block and a second symbol block each comprising the same information bearing symbol, and the plurality of pulse generators generate a first UWB waveform from the first symbol block and a second UWB signal from the second symbol block for simultaneous transmission via the plurality of antennas.

14. The wireless communication device of claim 12, wherein the ST encoder parses the stream of symbols into blocks of symbol pairs and, for each symbol pair, generates a first symbol block that stores the pair of symbols in a first order and a second symbol block that duplicates the pair of symbols and stores the pair of symbols in a second order opposite from the first order.

15. The wireless communication device of claim 12, further comprising a frame interleaver that permutes the frames to interleave the frames.

16. The wireless communication device of claim 12, wherein the pulse shapers modulate the pulses for transmission repeatedly over the frames.

17. The wireless communication device of claim 12, wherein the pulse shapers apply pulse amplitude modulation to the pulses.

18. The wireless communication device of claim 12, wherein the pulse shapers apply pulse position modulation.

19. The wireless communication device of claim 12, wherein the wireless communication device comprises one of a base station and a mobile device.

20. A wireless communication device comprising:

a plurality of antennas to receive a plurality of space-time (ST) encoded ultra wideband (UWB) waveforms through a wireless communication channel; and

a maximum ratio combining (MRC) unit that processes the ST encoded UWB signals and produces a stream of estimate symbols.

21. The wireless communication device of claim 20, wherein the received UWB waveforms are separated into even and odd indexed frames at the receive antennas.

22. The wireless communication device of claim 20,

wherein the plurality of antennas comprise a first antenna that receives a first UWB waveform and a second antenna that receives a second UWB waveform, and

wherein the MRC unit:

performs maximum ratio combining (MRC) on the first UWB waveform to yield a first decision statistic,

performs MRC on the second UWB waveform to yield a second decision statistic,

combines the first and second decision statistics to create a combined decision statistic, and

outputs one of the estimate symbols based on the combined decision statistic.

23. The wireless communication device of claim 20, wherein the wireless communication device comprises one of a base station and a mobile device.

24. An ultra-wideband communication system comprising:

a transmitter that outputs a plurality of space-time (ST) encoded ultra wideband (UWB) waveforms via a plurality transmit antennas; and

a receiver that receives the plurality of ST-encoded UWB waveforms via a wireless communication channel, and performs maximum ratio combining (MRC) on the UWB signals to produce estimate symbols.

25. The ultra-wideband communication system of claim 24, wherein the receiver comprises a plurality of receive antennas to receive the UWB waveforms.

26. The ultra-wideband communication system of claim 25, wherein the received UWB waveforms are separated into even and odd indexed frames at the receive antennas.